

## Determining diet composition in free-ranging grazers

Researchers from Pwllpeiran recently worked with scientists from the University of Sheffield to develop and test new ways of monitoring diet composition as part of a multi-disciplinary project led by the University of Edinburgh. The 'Ecology Within' project ran from 2019 to 2024 and was the latest in a series of studies on the Soay sheep of St Kilda.



As part of the research at Pwllpeiran, a small flock of 17 Soay sheep was created from animals sourced from mainland flocks that can trace their lineage back to the islands. Samples collected from these animals were used to develop and validate DNA meta-barcoding

techniques which use the latest next-generation sequencing technologies to build up a profile of plant DNA in an animal's faeces. During controlled indoor feeding trials with different forage mixes, samples were collected and the diet eaten estimated. The results were then compared with the known

composition of the diet as fed, to determine the extent to which barcode sequence frequencies accurately represent proportional intake of each plant component. We found that while DNA metabarcoding could differentiate well between different plant functional groups, identifying which grasses had been eaten was often only possible to the Family level,

or at best Genus level. It is recommended that controlled experiments are conducted with different ruminants on different forage types to explore between-species differences in diet reconstruction accuracy, together with the potential to develop corresponding correction factors.

This was latest in a series of approaches to estimating diet composition that have been tested, developed and deployed by researchers at Pwllpeiran. These methodologies have included reconstructing diets based on concentrations of *n*-alkanes and long-chain fatty alcohols in faeces and plants, and rapid screening of dietary differences using Fourier-transform near infrared spectroscopy and front-face fluorescence emission spectroscopy.

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